

## In the Claims

1. (CURRENTLY AMENDED) A heat exchanger to variably control the temperature of a process fluid in a reaction system, said heat exchanger comprising:

a reaction vessel containing~~comprising~~ a heat transfer surface about its exterior, wherein said heat transfer surface is in contact with said~~the~~ process fluid disposed within said reaction vessel; and

a plurality of circumferential heat transfer conduits which allow for the independent control of heat transfer fluid supplied to each said heat transfer conduit, wherein said heat transfer conduits are disposed about and in contact with said heat transfer surface~~around the circumference of said reaction vessel,~~ whereby the transfer of heat between said process fluid and said heat transfer fluid occurs across~~to provide a~~ said heat transfer surface between the heat transfer conduits and the reaction vessel;

wherein each of said plurality of heat transfer conduits has a length of at most twice the circumference of said vessel and supplied with heat transfer fluid;

wherein said plurality of heat transfer conduits number from 10 to 200 and carry a flowing heat transfer fluid; and

wherein each of said 10 to 200 heat transfer conduits extends around the circumference of the reaction vessel and wherein each conduit has a cross sectional area for the flow path of less than 2,000 square millimetres.

2. (CANCELED).

3. (PREVIOUSLY PRESENTED) A heat exchanger according to claim 1 wherein each of said 10 to 200 conduits has a cross sectional area for the flow path of less than 500 square millimetres.

Claims 4 through 8 (CANCELED).

9. (PREVIOUSLY PRESENTED) A heat exchanger according to claim 1 wherein the linear velocity of the heat transfer fluid through the heat transfer conduits is between 0.5 and 5 m.s<sup>-1</sup> for liquid cooled systems when the heat exchanger is operating at full design load and between 2 and 20 m.s<sup>-1</sup> for gas cooled systems when the heat exchanger is operating at full design load.

Claims 10 through 13. (CANCELED).

14. (CURRENTLY AMENDED) A heat exchanger according to claim 1, ~~whereby the heat transfer fluid flows within independent conduits which are not in direct contact with the gas, liquid or solid which is being heated or cooled and that wherein~~ the heat transfer fluid conduits are bonded, fused, glued, brazed, welded or soldered to the heat transfer surface which serves as the containment barrier for the gas, liquid or solid which is being heated or cooled.

Claims 15 through 58 (CANCELED).

59. (WITHDRAWN) A heat exchanger according to claim 1 wherein the heat transfer fluid conduit or conduits is held to the surface which serves as the containment barrier for the gas, liquid or solid which is being heated or cooled by means of clamps, springs, wires, natural shape of the conduit or some other form mechanical fixing and a layer of a soft, thermally conductive material such as conductive grease, fluid, conductive wool, fibrous conductive mat or a mixture thereof is provided between the transfer fluid conduit and the surface which serves as the containment barrier for the gas, liquid or solid which is being heated or cooled.

60. (WITHDRAWN) A heat exchanger according to claim 1 wherein the conduit

for the heat transfer fluid is mounted on an expansion plate to permit independent movement of the heat transfer conduit in relation to the containment barrier for the gas, liquid or solid which is being heated or cooled.

61. (PREVIOUSLY PRESENTED) A heat exchanger according to claim 1 which uses a variable area heat transfer surface.

62. (CANCELED).

63. (WITHDRAWN) A heat transfer system for the transfer of heat between a process fluid and a heat transfer fluid across a heat transfer surface comprising a heat transfer conduit for passage of the heat transfer fluid attached to an expansion plate said expansion plate being in contact with the heat transfer surface said expansion plate enabling independent movement of the heat transfer conduit and the heat transfer surface.

64. (WITHDRAWN) A heat transfer system according to claim 63 wherein the heat transfer fluid is delivered in at least five heat transfer conduits each having a cross sectional area for the flow path of less than 2000 square millimetres wherein the linear velocity of the heat transfer fluid through the heat transfer conduits is from  $0.5$  to  $20 \text{ m.s}^{-1}$  and adapted so that the temperature of the heat transfer fluid changes by at least  $1^{\circ}\text{C}$  when they system is operating at full design load.

65. (WITHDRAWN) A heat transfer system according to claim 63 whereby the heat transfer fluid flows within independent conduits which are not in direct contact with the gas, liquid or solid which is being heated or cooled and that the heat transfer fluid conduit is bonded, fused, glued, brazed, welded or soldered to the surface which serves as the containment barrier for the gas, liquid or solid which is being heated or cooled.

66. (WITHDRAWN) A heat transfer system according to claim 63 where the

heat transfer fluid flows within independent conduits which are not in direct contact with the gas, liquid or solid which is being heated or cooled and the heat transfer fluid conduit is held to the surface which serves as the containment barrier for the gas, liquid or solid which is being heated or cooled by means of clamps, springs, wires, natural shape of the conduit or some other form mechanical fixing and the gap between the heat transfer fluid conduit and the surface which serves as the containment barrier for the gas, liquid or solid which is being heated or cooled is filled by means of a soft, thermally conductive material such as conductive grease, fluid, conductive wool, fibrous conductive mat or a composite of several of these materials.

67. (PREVIOUSLY PRESENTED) The heat exchanger of claim 1, wherein each of said plurality of heat transfer conduits has a valve attached thereto to control the flow of heat transfer fluid entering and exiting the conduit.

68. (PREVIOUSLY PRESENTED) The heat exchanger of claim 1, wherein each of said plurality of heat transfer conduits has a separate inlet and a separate outlet.

69. (CANCELED).

70. (PREVIOUSLY PRESENTED) The heat exchanger of claim 1, wherein said plurality of heat transfer conduits contains an even distribution of heat transfer fluid.

71. (NEW) The heat exchanger of claim 1 wherein each of the heat transfer conduits has a length equal to the perimeter of the reaction vessel.